Expression of KXHKN4 and KXHKN5 genes in K. Blossfeldiana cv. 'Molly' results in novel compact plant phenotypes - towards a cisgenesis alternative to growth retardants

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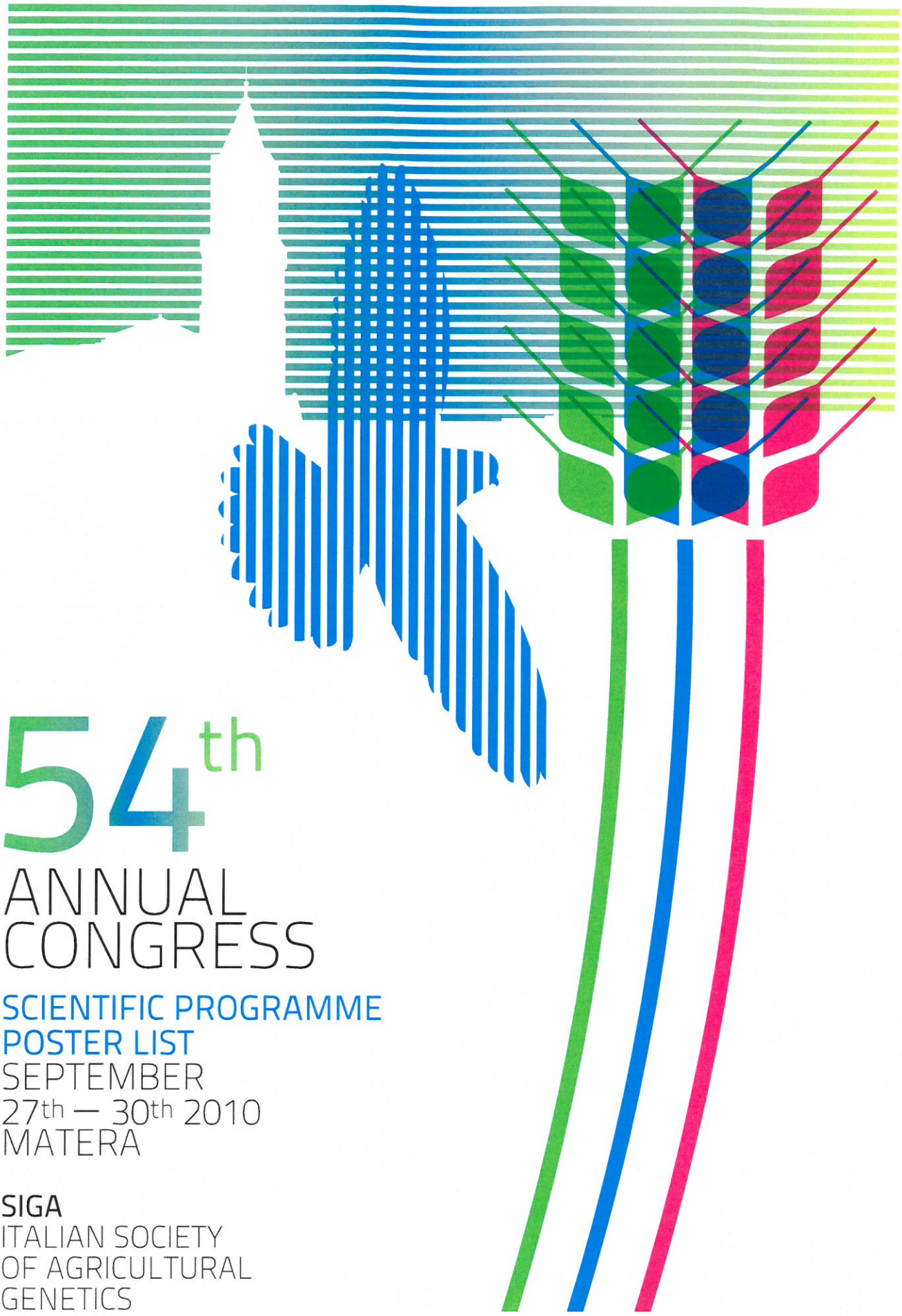

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EXPRESSION OF *KXHKN4* AND *KXHKN5* GENES IN *K. BLOSSFELDIANA* CV. 'MOLLY' RESULTS IN NOVEL COMPACT PLANT PHENOTYPES – TOWARDS A CISGENESIS ALTERNATIVE TO GROWTH RETARDANTS

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KNOX genes, plant architecture, overexpression, silencing

Many cultivars of *K. blossfeldiana* and interspecific hybrids derived from this species are very important for the horticultural plant industry. *Kalanchoë* ranked as top one in Denmark with over 42 million plants produced in 2007. A quality criterion for flowered pot plants is compactness; however, plants of many species (eg. *Kalanchoë*) have an elongated natural growth habit, which has to be reduced and controlled through the application of various growth retardants. From a breeder point of view, genetic engineering is the elite approach to generate new variation if adequate natural variation is absent in a given species and related ones. TALE (*BEL* and *KNOX*) and *WOX* classes of homeotic genes play a central role in plant development being involved in meristem establishment, self maintenance and organ differentiation and then putatively involved in plant architecture. The *KNOX* gene *KxhKn4* (class II) and *KxhKn5* (class I) were cloned from *K. x houghtonii* a species that express vegetative vivipary under long day condition. Overexpression (*KxhKn4, KxhKn5)* and silencing (*KxhKn5)* constructs were inserted by *Agrobacteruim* transformation in the commercially important *Kalanchoe blossfeldiana* cv. 'Molly'. Distint transgenic clones derived from all three constructs exhibited plant height variable from normal to extremely compact. Plant diameter was significantly reduced in the overexpressing clones with one exception for a *KxhKn4* derived clone. Some lines had a relative higher number of branches per stem unit and flowering time comparable to untransformed cv 'Molly'. Moreover, overexpression of *KxhKn4* resulted in plants with dark green leaves due to an elevated content of chlorophyll, a highly desired property in the ornamental plant industry. Overall, clones derived from silencing of *KxhKn5* or overexpression of *KxhKn4* showed a desirable aspect from an ornamental point of view. We present here a cisgenesis approach towards compact plants with improved quality as an alternative to chemical growth retardants.